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(54) SYSTEM AND METHOD FOR THERMOPHILIC ANAEROBIC DIGESTER PROCESS

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(Continued)

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(56) References Cited

U.S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

GB 2190682 A * 11/1987 SU 1405803 A1 * 6/1988

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(57) ABSTRACT

A new approach is proposed that contemplates systems and methods to support an environmentally-friendly, "green" thermophilic anaerobic digestion system. The system includes a thermophilic anaerobic digester as well as various independent modular anaerobic units to generate bio-methane from certain organic energy sources, including but not limited to, among other things, green municipal waste, restaurant and organic waste and effluents from industries such as breweries, grocery stores, food processing plants, granaries, wineries, pulp and paper mills, ethanol and biodiesel plants, fat and animal rendering, agricultural field crops, organic sludge accumulation within lagoons and waterways, marine organic matter and animal manure.

25 Claims, 5 Drawing Sheets

